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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,783	11/14/2001	Yuch Ping Hsieh	90024	3137
9355	7590	12/16/2004		
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, PA P.O. BOX 3791 ORLANDO, FL 32802-3791				
			EXAMINER GAKH, YELENA G	
			ART UNIT 1743	PAPER NUMBER

DATE MAILED: 12/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/990,783

Applicant(s)

HSIEH ET AL.

Examiner

Yelena G. Gakh, Ph.D.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2004.
- 2a) ☒ This action is **FINAL**.
- 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
 - 4a) Of the above claim(s) 14-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/14/01 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 - Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 - Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some * c) ☐ None of:
 - 1. ☐ Certified copies of the priority documents have been received.
 - 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Amendment filed on 10/22/04 is acknowledged.

Response to Amendment

2. Rejections of claims under 35 U.S.C. 112, first and second paragraphs are withdrawn in view of the amendment. Objection to the specification remains.

Specification

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. The specification is objected to as not containing "a written description of the invention, ... in such full, clear, concise, and exact terms as to enable any person skilled in the art" to practice the invention in its best mode. In particular, it is not clear from the specification, which rate of a gas evolution in solids and liquids is determined by the method, if the micro-respirometer is constantly shaking at various speeds. It is well known from the prior art that agitating a vessel containing the sample, which produces carbon dioxide increases the rate of evolution by increasing the rates of forming the gas and diffusion from the sample into air (see e.g. Chicoye et al. US 4,068,005, col. 1, lines 43-53; "Shaking Soda Cans"). Therefore, shaking the microrespirometer changes the evolution rate of CO₂, and thus the measurements do not reflect a "natural" evolution rate. There is no indication of this phenomenon in the specification. Rather, the specification refers only to increasing an absorption rate of carbon dioxide, obtained from non-analogous experiments of absorbing CO₂ by the reagent from the air. The latter is a different and much simpler physical-chemical process involving carbon dioxide, since it does not involve evolution of carbon dioxide from the liquid or solid sample and diffusion of the evolved gas into air. It is not clear, how the results of these experiments can be introduced into a more

complex process of CO₂ evolution from the liquid or solid sample. The experiments are designed to optimize conventional parameters of CO₂ absorption, such as the shaking rate of the vessel, which increases diffusion of CO₂ into the reagent solution, and NaOH concentration. Experiment #4 is not clear. It just demonstrates increasing the rate of absorption with increasing CO₂ concentration, which is an obvious fact. It is not clear, what this experiment has to demonstrate, and how it can be used for the "real" case. As for the CO₂ absorption/evolution equilibrium, this part of the specification is not apparent to the examiner. According to the Merriam-Webster Online Dictionary, "an equilibrium is a state of balance between opposing forces or actions that is either static (as in a body acted on by forces whose resultant is zero) or dynamic (as in a reversible chemical reaction when the rates of reaction in both directions are equal)". It is not clear, which reversible reactions (or processes) are considered here. While evolution of CO₂ can be considered a reversible process because of reversible CO₂ diffusion between gaseous environment and the solid or liquid sample, absorption of CO₂ by the disclosed system is irreversible, since BaCO₃ is precipitated. It is not clear at all, how the equilibrium between two completely different processes can be reached, especially when one of the rates (of "natural" evolution) is not controllable, while the other is controlled by adjusting concentration of NaOH? Theoretically it is possible to find the conditions, when the rate of absorption will be adjusted to be equal to the rate of evolution. However, the specification does not clearly disclose such adjustment. What is described in the "real" experiment (page 8) is reaching the first end point of titration with larger amount of NaOH, setting its time as a reference time, and adding another, a smaller aliquot of NaOH to measure the absorption rate of CO₂ with a presumption that it is equal to the evolution rate of CO₂. It is not clear, what this experiment has to do with "equilibrating the sample with the alkaline solution". It is not apparent what the latter expression really means, since the sample is not even in a contact with the solution. Moreover, it is not clear, how Figure 4 should demonstrate that such equilibrium could be reached. It is not clear, where does the conclusions that "if the starting CO₂ evolution rate of the sample 19 is 100 $\mu\text{L/h}$, the CO₂ concentration of the respirometer 11 is increased to about 660 ppm and remain there because an equilibrium of CO₂ absorption and evolution is established" come from? Which experiment demonstrates this? Then, on page 10 the specification discloses evaluating a time period required for establishing this equilibrium through a mathematical relation between

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changes of CO₂ concentration in the respirometer and difference in absorption and evolution rates. While it is clear, that what is called "equilibrium" is an equality of absorption and evolution rates, it is not clear, how this equality can be determined in practice. It is not clear, what is the process, which makes E equal A_{ci} and the concentration C constant? Even less it is clear, how % of equilibration value can reach 400 (Figure 5), and what does Figure 5 demonstrates in general?

Drawings

5. The drawings are objected to, because in Figure 5 it is not clear, the equilibrated value of what is defined on y-axes.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. **Claims 1-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al. (Abstract, 1999) in view of Harp (US 6,368,870 B1).

Baker teaches the equilibrium vapor method for determination of evolved CO₂, which involves the measurement of CO₂ concentration in the headspace of a water sample by gas chromatography and calculation of total concentration of dissolved carbon dioxide by using equilibrium relations of the carbonate system, implying Henry's law. The method is most accurate when sample pH is low (near the alkalinity titration endpoint, about 4.3) when the standard titration method is least accurate or inapplicable. Equilibrium vapor method requires establishing equilibrium for all CO₂ in the system.

Baker does not specifically teach using NaOH-BaCl₂-pH indicator system for detecting evolved CO₂. Titration of evolved CO₂ with NaOH using pH indicator, especially phenolphthalein, to measure an amount and therefore the evolution rate of CO₂, is a well-known technique (see e.g. references cited in Rowell, Soil Biol. Biochem., 1995). The method comprises the step of calculating the evolution rate based on the amount of the titrant absorbed in time.

It would have been obvious for anyone of ordinary skill in the art to modify equilibrium vapor method of Baker by using a simpler colorimetric technique recited in Rowell's references instead of gas chromatography, if pH of the sample is not very low (i.e. CO₂ concentration is not very high), since colorimetric technique is cheaper and well-suited to field studies (see Rowell, page 373, left column).

Response to Arguments

10. Applicant's arguments filed 10/22/04 have been fully considered but they are not persuasive. Moreover, the Applicants do not seem to address all questions imposed by the examiner regarding non-clarity of the disclosure, including experiments and their results.

Regarding objection to the specification. As the examiner indicated in the previous Office action, the term "equilibrium" used throughout the specification contradicts its conventional meaning. Equilibrium refers to a reversible process, having equal rates of direct and reverse processes. There is no such reversible process in the instant method. There are two processes, an evolution of CO_2 , and absorption of CO_2 . If evolution and absorption of CO_2 were considered for the same two-phase system, with CO_2 reversibly absorbed by e.g. liquid or solid phase, then there would be equilibrium in such system, if the rates of evolution and absorption of CO_2 were the same. However, this is not the case for the instant application, since absorption of CO_2 in the system is an irreversible process with CO_2 irreversibly transformed into insoluble BaCO_3 , which precipitates. The examiner believes, that the term "equilibrium" is not applicable to such system. If the applicants have a different opinion, the examiner would like to ask the applicants to provide any reference, which would describe equilibrium in such system.

Regarding the rejection over the prior art. As it is indicated in the previous and present Office actions, "titration of evolved CO_2 with NaOH using pH indicator, especially phenolphthalein, to measure an amount and therefore the evolution rate of CO_2 , is a well-known technique (see e.g. references cited in Rowell, Soil Biol. Biochem., 1995). *The method comprises the step of calculating the evolution rate based on the amount of the titrant absorbed in time*". This completely covers the subject matter of the instant application. The arguments referring to equilibrium in the present system are not convincing, as the examiner believes that the term "equilibrium", which has an unambiguous conventional meaning, is not applicable for the present system. Again, if the Applicants have a different point of view, i.e. that equilibrium can be reached between two completely different processes, one of which is irreversible, the examiner requests submitting any reference describing such equilibrium.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (571) 272-1257. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yelena G. Gakh
12/13/04

